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Docket No.: 50090-288 PATENT

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE
BEFORE THE BOARD OF PATENT APPEALS AND INTERFERENCES

In re Application of	:	Customer Number: 20277
Toshiaki OHMORI	:	Confirmation Number: 3783
Application No.: 09/826,038	:	Group Art Unit: 1765
Filed: April 5, 2001	:	Examiner: K. Chen

For: METHOD FOR MANUFACTURING SEMICONDUCTOR DEVICE USING PREDETERMINED MEASUREMENT VALUE

TRANSMITTAL OF APPEAL BRIEF

Mail Stop Appeal Brief - Patents
Commissioner for Patents
P.O. Box 1450
Alexandria, VA 22313-1450

Sir:

Submitted herewith in triplicate is Appellant's Appeal Brief in support of the Notice of Appeal filed November 12, 2003. Please charge the Appeal Brief fee of $330.00 to Deposit Account 500417.

To the extent necessary, a petition for an extension of time under 37 C.F.R. § 1.136 is hereby made. Please charge any shortage in fees due in connection with the filing of this paper, including extension of time fees, to Deposit Account 500417 and please credit any excess fees to such deposit account.

Respectfully submitted,

MCDERMOTT, WILL & EMERY

Scott D. Paul
Registration No. 42,984

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Date: January 12, 2004
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Sir:

This Appeal Brief is submitted in support of the Notice of Appeal filed November 12, 2003.

I. REAL PARTY IN INTEREST

The real party in interest is Renesas Technology Corp.

II. RELATED APPEALS AND INTERFERENCES

Appellant is unaware of any related appeals and interferences.

III. STATUS OF CLAIMS

Claims 4-19 are pending in this application. Claims 4-5 and 7-19 have been withdrawn from consideration pursuant to the provisions of 37 C.F.R. § 1.142(b). Claim 6 has been finally rejected, and it is from the final rejection of claim 6 that this Appeal is taken.

IV. STATUS OF AMENDMENTS

No amendment to the claim has been filed subsequent to the Final Office Action dated July 15, 2003.

V. SUMMARY OF INVENTION

The present invention addresses and solves problems which arise during manufacture of a semiconductor device. Using etching conventional techniques, a process of etching a film on a wafer is controlled by measuring the thickness of the film at an arbitrary frequency after formation or etching of the film (page 1 of the written description of the specification, lines 16-17). In a related conventional technique, this data obtained by periodically measuring the film is used to determine the time at which an alarm is to be issued or maintenance of the etching system is to be performed. Alternatively, the data is used for adjusting the etching techniques in the prior etching process (page 1, lines 19-25). The data collected from these techniques, however, is not reflected in the wafer from which the data is collected. Where multiple processes are used, the current techniques are not capable of preventing processing errors from the multiple processes from being accumulated in a wafer. Therefore, a need existed for a process that reflected the state of a wafer in the requirements for processing the same wafer.

According to the present invention, this need is met, per independent claim 6, by acquiring a dimension of a film after the film is dry etched and using the acquired dimension of the film to determine the process requirements of a subsequent wet etching process on the film. As described on page 6 of the specification, each wafer can have an assigned ID, and this ID is used to track dimensions obtained from the wafer. After a dimension (e.g., a thickness of the film) is obtained after a processing step (e.g., dry etching), a computer uses the dimension in a recipe to determine the processing characteristics for the next processing step (e.g., wet etching). In so doing, the processing characteristics of the subsequent step can be adjusted to compensate for any process error from the prior step. The claimed invention, thus, constitutes an improvement over conventional manufacturing processes by reflecting the state of a wafer in the requirements for processing the wafer in subsequent processes through use of a feed forward technique.

VI. ISSUES

The Issue Which Arises In This Appeal And Requires Resolution By The Honorable Board of Patent Appeals And Interferences (The Board) Is:

1. Whether claim 6 is unpatentable under 35 U.S.C. § 103 for obviousness based upon Funk et al., U.S. Patent No. 6,148,239 (hereinafter Funk).

VII. GROUPING OF CLAIM

Claim 6 is the sole claim on appeal.

VIII. THE ARGUMENT

THE REJECTION OF CLAIM 6 UNDER 35 U.S.C. § 103 FOR OBVIOUSNESS BASED UPON FUNK

The Examiner's rejection of claim 6 for obviousness based upon Funk, as articulated in the Final Office Action dated July 15, 2003, and confirmed in the Advisory Action dated October 17, 2003, does not have a proper basis for at least two reasons: the Examiner has not established that Funk teaches or suggest all of the claimed limitations, and the Examiner has not established a motivation to modify Funk so as to arrive at the claimed invention.

Claim 6 recites that a dry etching of a film is performed prior to wet etching of the film. Claim 6 also recites that after dry etching, a dimension of the film to be processed is acquired and processing requirements of the wet etching process are determined based upon the acquired dimension of the film. Therefore, Appellant has claimed:

(a) a specific set of processing steps;

(b) a specific order in which these processing steps are to be performed; and

(c) a specific variable that is to be acquired after one of the processing steps and later used to determine processing requirements of a subsequent processing step.

Upon reviewing the Examiner's statement of the rejection, Appellant submits that Funk fails to identically disclose the following claimed features.

(a) the specific set of processing steps (i.e., dry etching and wet etching);

(b) the specific order in which these processing steps are to be performed (i.e., wet etching after dry etching); and

(c) the specific variable (i.e., dimension of the film) that is to be acquired after the dry etching and later used to determine processing requirements of the wet etching.

With regard to (a) above, the Examiner stated the following in the Final Office Action:

> The processing processes may include dry etching (plasma etching) and wet etching (col.2, lines 38-60; col. 11, lines 12-25).

The citation to column 2 in Funk by the Examiner is silent as to dry etching and wet etching, and for ease of reference, Appellant has reproduced below column 11, lines 12-25 of Funk:

> The material may be etched in multiple etching chambers using different etch processes such as wet etch operations and plasma etch operations using a variety of etching chemistries. The multiple chambers may further have different performance characteristics. FICD measurements are highly useful for determining characteristics and performance of the process that are substantially relevant to the performance characteristics, such as electrical characteristics and operating speed, of the ultimate fabricated parts.
>
> In one embodiment, the feed forward operation 316 includes an analysis of the FICD to determine the control adjustments forwarded in the process. The result steps maintain a running count of the measured FICD values for each material thread.

As evident from the above citation, Funk does not specifically teach that a specific single set of processing steps includes dry etching and wet etching. Although Funk mentions that wet etch operations and plasma etch operations can be used, Funk fails to teach using both of these operations in a single set of processing steps let alone the claimed requirement that wet etching takes place after dry etching.

With regard to (b) above, the Examiner stated the following in the paragraph spanning pages two and three of the Final Office Action:

> The instant claim differs from Funk by specifying wet etch after the step of dry etching. However, Funk teaches that a plurality of processing processes may be performed in sequences. The processing processes may include dry etching (plasma etching) and wet etching. Therefore, it would have been obvious to one with ordinary skilled [sic] in the art to perform various processes in various sequences (e.g., wet etching after a dry etching as claimed) depending on the specific product requirement.

Notwithstanding that Appellant has already established that Funk does not specifically teach using both dry etching and wet etching in a single sequence of processing steps, the Examiner

has failed to establish a realistic motivation to modify Funk so as to arrive at the claimed limitation of performing wet etching after dry etching. The Examiner's assertion that "it would have been obvious to one with ordinary skilled in the art to perform various processes in various sequences ... depending on the specific product requirement" is overly broad and based on generalities.

The Federal Circuit has long disapproved of establishing the requisite motivation to modify a particular reference based upon generalities. The Federal Circuit has repeatedly held that in order to establish the requisite motivation, the Examiner must make "clear and particular" factual findings as to a specific understanding or specific technological principle which would have realistically impelled one having ordinary skill in the art to modify a particular prior art reference to arrive at the claimed invention based upon facts, not generalizations.[1] In so doing, the Examiner is burdened to provide facts and explain why one having ordinary skill in the art would have been realistically motivated to modify the methodology disclosed by Funk to perofrm wet etching after dry etching. That burden, however, has not been discharged. Thus, the Examiner has failed to establish the requisite motivation to modify Funk so as to arrive at the claimed invention.

With regard to (c) above, the Examiner stated the following in the final full paragraph on page two of the Final Office Action:

> The dimension (e.g., FIDC) [sic] of the film may be acquired. The processing requirements for the subsequent process may be determined on the basis of the dimension of the film to be processes. [sic].

[1] Ruiz v. A.B. Chance Co., 234 F.3d 654, 57 USPQ2d 1161 (Fed. Cir. 2000); Ecolochem Inc. v. Southern California Edison, Co., 227 F.3d 1361, 56 USPQ2d 1065 (Fed. Cir. 2000); In re Kotzab, 217 F.3d 1365, 55 USPQ 1313 (Fed. Cir. 2000); In re Dembiczak, 175 F.3d 994, 50 USPQ2d 1614 (Fed. Cir. 1999).

As recited in claim 6, the specific claimed variable that is to be acquired after the dry etching and later used to determine processing requirements of the wet etching is the dimension of the film. Although the Examiner asserts that the "FICD" (Final Inspect Critical Dimension; column 5, lines 36-37) measurement corresponds to the claimed dimension of the film, Appellant has been unable to determine where this specific teaching can be found in Funk. In fact, Funk is neither clear as to the dimensions nor the features that are included in the FICD.

The Examiner has produced, at best, a reference that discloses using a feed forward control mechanism with regard to the manufacture of semiconductor devices. However, the mere concept of a feed forward control mechanism (i.e., obtaining a variable after a first process to modify the operation of a second process) is not sufficient suggestion to teach that both wet etching and dry etching are used in a single process sequence; the particular sequencing of the wet etching and the dry etching; and the dimension (i.e., of the film after dry etching) used to determine the process requirements of the wet etching. The Examiner has also failed to establish a realistic motivation in the prior art to modify Funk to arrive at the claimed invention. Appellant, therefore, respectfully submits that one having ordinary skill in the art would not have been motivated to modify Funk to arrive at the claimed invention.

IX. CONCLUSION

It should, therefore, be apparent that the Examiner did not discharge the initial burden of establishing a prima facie case of obviousness under 35 U.S.C. § 103. Appellant, therefore, respectfully submits that the imposed rejection of claim 6 for obviousness based upon Funk is not factually or legally viable and, hence, solicits withdrawal thereof.

X. PRAYER FOR RELIEF

Based upon the foregoing, Appellant respectfully submits that one having ordinary skill in the art would not have found the claimed invention as a whole obvious within the meaning of 35 U.S.C. § 103. Appellant, therefore, respectfully solicits the Honorable Board to reverse the Examiner's rejection under 35 U.S.C § 103.

To the extent necessary, a petition for an extension of time under 37 C.F.R. § 1.136 is hereby made. Please charge any shortage in fees due in connection with the filing of this paper, including extension of time fees, to Deposit Account 500417 and please credit any excess fees to such deposit account.

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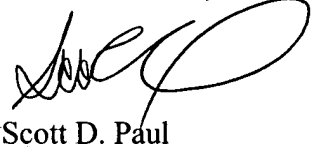

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APPENDIX

6. A method of manufacturing a semiconductor device including a plurality of processing processes, the method comprising the steps of:

dry etching a predetermined film to be processed;

wet etching, after said step of dry etching, the predetermined film to be processed;

acquiring, after said step of dry etching, the dimension of the film to be processed;

determining processing requirements for said step of wet etching on the basis of the dimension of the film to be processed; and

wherein said step of wet etching is performed in accordance with the processing requirements.

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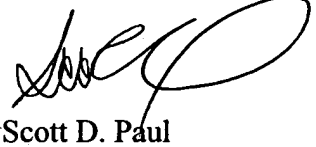

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